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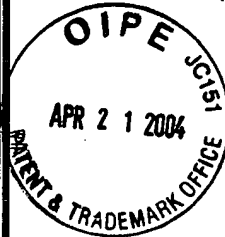
on April 12, 2004



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Signature

**PATENT**  
#03-0204-UNI  
Case #F7687(V)



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Daniels et al.  
Serial No.: 10/738,339  
Filed: December 17, 2003  
For: EDIBLE EMULSION CONTAINING HIGHLY UNSATURATED FAT

Edgewater, New Jersey 07020  
April 12, 2004

**SUBMISSION OF PRIORITY DOCUMENT**

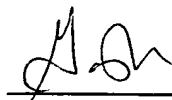
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Pursuant to rule 55(b) of the Rules of Practice in Patent Cases, Applicant(s) is/are submitting herewith a certified copy of the German Application No. 20220081.7 filed December 23, 2002, upon which the claim for priority under 35 U.S.C. § 119 was made in the United States.

It is respectfully requested that the priority document be made part of the file history.

Respectfully submitted,



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Issued for true certified copy as meant in Article 49, Paragraph 3 of the Civil Law Notaries Act (Wet op het Notarisambt) by me, Oscar Willem Jan Hoefnagels, as a substitute of Victor Joseph Antonius Johannes Clemens van Heeswijk, civil law notary in Rotterdam, the Netherlands.

Rotterdam, 03 December 2003



A handwritten signature in black ink, appearing to read 'Oscar Willem Jan Hoefnagels', written over a horizontal line.



**Prioritätsbescheinigung über die Einreichung  
einer Gebrauchsmusteranmeldung**

**Aktenzeichen:** 202 20 081.7

**Anmeldetag:** 23. Dezember 2002

**Anmelder/Inhaber:** Unilever N.V., Rotterdam/NL

**Bezeichnung:** Edible Emulsion Containing Highly Unsaturated Fats

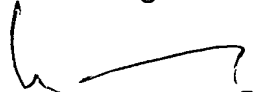
**IPC:** A 23 D 7/00

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der ursprünglichen Unterlagen dieser Gebrauchsmusteranmeldung.

München, den 12. November 2003  
**Deutsches Patent- und Markenamt**

**Der Präsident**

Im Auftrag

  
Hoiß

## EDIBLE EMULSION CONTAINING HIGHLY UNSATURATED FATS

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### Field of the invention

- 10 The present invention deals with a low fat edible emulsion spread of which the dispersed fat phase contains a substantial amount of unsaturated vegetable oils.

### 15 Background and related art

- Spreads which consist of a water continuous emulsion often are derived from dairy ingredients such as the spread described in EP841856. A dairy based spread is appreciated because of its fine taste and flavour. However, the fat phase consists of milk  
20 fat which is relatively expensive and is not preferred from the point of view of healthy nutrition.

EP1065937 describes spreads in which the milk fat has been partially replaced by vegetable fat.

- 25 From a nutritional point vegetable fats such as sunflower seed oil, rapeseed oil, corn oil, linseed oil and soybean oil, are preferred over milk fat. Those fats have a recommended high content of unsaturated fatty acid residues such as the residues of oleic acid, linoleic acid and linolenic acid.

- 30 However, water continuous emulsion spreads of which the fat phase contains a high content of such unsaturated fatty acids are known for suffering from quick taste deterioration. Only by incorporating in such emulsions an effective amount of the

potent antioxidant EDTA a spread could be obtained with a reasonable shelf life. EDTA, however, being considered an artificial chemical additive, preferably is omitted from food compositions. For the taste stability problem the present  
5 invention provides a solution which does not rely on EDTA.

#### Summary Of The Invention

For a low fat spread consisting of a water continuous emulsion  
10 in which is dispersed a highly unsaturated fat phase we have found a composition with which a flavour stability of at least 9 weeks can be realized. Such emulsion is defined in claim 1 and is characterized by the presence of delta-tocopherol as antioxidant agent.

#### Details Of The Invention

All percentages in this specification are weight percentages and calculated on final product, unless specified otherwise.

0

The critical measure for obtaining flavour stability of the present emulsion spread is the presence of delta-tocopherol (d-tocopherol). The delta-tocopherol concentration should be  
5 chosen from the range 0.005 - 0.03 wt.%. The optimum concentration depends on the composition of the spread, particularly on the used fat phase. The skilled man can easily establish a suitable concentration by some trial experiments.

Tocopherols are known food anti-oxidant agents which are  
10 usually made available as an isolate from a natural vegetable source which comprises alfa-, beta-, gamma- and delta-tocopherols. The ratio of delta-tocopherol and alpha-tocopherol  
in the tocopherol ingredient used for the present spread is at

least 2/1. A suitable tocopherol preparation contains 0.018 wt.% of d-tocopherol and 0.007 wt.% of a-tocopherol. Preferably the content of alpha-, beta- and gamma-tocopherols in the preparation is less than 1 wt.%.

5

According to a preferred embodiment the antioxidant agent comprises also citric acid. The concentration of citric acid is chosen from the range 0.04 - 0.08 wt.%. The optimum concentration depends on the composition of the spread, particularly on the used fat phase. The skilled man can easily establish a suitable concentration by some trial experiments. Citric acid is used preferably as a 30 wt.% aqueous solution.

The spread composition preferably contains no or anyway less than 1 ppm of EDTA, but the invention comprises also products additionally containing EDTA up to the maximum concentration which is legally permitted.

The spread of the present invention contains 20 - 30 wt.% of dispersed triglyceride fat phase. The composition of the triglyceride mixture is within the ranges shown by Table I.

Table I

Properties of total fat phase (1)	
PUFA	> 40 wt.%
MUFA	20 - 80 wt.%
SAFA	15 - 25 wt.%

(1) PUFA: poly-unsaturated fatty acids, MUFA: mono-unsaturated fatty acids, SAFA: saturated fatty acids.

For preparing the blend of the fat phase any vegetable oil and marine oil suited for spread preparation may be selected, provided the blend complies with the fat phase specification shown in Table I and as defined in claim 1. The blend preferably contains an oil component with a relatively high content of omega-3 fatty acids residues such as linseed oil. Suitable oils comprise sunflower seed oil, rapeseed oil, corn oil, linseed oil and soybean oil. Corn germ oil is a preferred fat phase ingredient. Dairy fat may be included for taste reasons. The presence of some structuring solid fat in the blend is advantageous when a more plastic spread consistency is desired. Suitable solid fats have a N-line preferably in the range shown by table II.

Table II

Solid fat content structuring fat	
N <sub>20</sub>	75 - 85
N <sub>30</sub>	55 - 65
N <sub>40</sub>	15 - 25

Suitable structuring fats are well known to the skilled man and are for example a palm fat fraction or an interesterified mixture of palm fat (e.g. a stearin fraction) and palm kernel fat. Solid fat is employed in an amount of 4 - 10 wt.% on fat phase. The actual amount is attuned to the desired spread consistency and is found by some trial preparations.

In the products according to the invention the presence of a biopolymer is necessary for stabilising the aqueous phase and prevention of syneresis. For the purpose of the invention the term biopolymer is defined such that it does not encompass protein. The biopolymer is selected preferably from the group



comprising locust bean gum, guar gum, tara gum, amylopectin, methylcellulose, alginate, starch, modified starch and high molecular weight pectin. Locust bean gum and guar gum are most preferred.

5

The concentration of biopolymer in food product according to the invention is from 0.01 to 3 wt.% which amount is effective for stabilising the aqueous phase. It will be appreciated that each individual biopolymer will have its own optimum

0 concentration which may depend on other characteristics of the food product such as the protein source, pH and salt content. Generally, for locust bean gum a suitable concentration is about 0.1 wt.%.

5 The product according to the invention contains a protein as structuring agent for the aqueous phase. Preferably the protein is selected from the group comprising milk protein, soy protein and pea protein. Milk protein is highly preferred because of its positive effect on the taste and flavour of the final  
0 product. Suitable sources of milk protein are milk, cream, skimmed milk powder, butter milk powder, butter serum powder, whey powder, whey protein concentrate, whey protein isolate and caseinate. Most preferred is butter milk protein because of its superb taste and flavour contribution.

6 The amount of protein is from 0.05 to 15 wt.%. For cost reasons the lowest possible protein concentration is preferred.

0 For further improving spreadability and mouthfeel, preferably some gelatin will be present. The product preferably comprises about 0.45 wt.% of gelatin. No beneficial effect was observed for levels exceeding 2%. Different gelatins may have varying bloom strengths. Consequently the amount of gelatin is adapted

to its bloom strength in order to provide an equivalent performance.

On behalf of some groups of consumers a replacer substance for gelatin is preferred. Gelatin replacers are components or  
5 compositions which have similar mouthfeel behaviour and similar performance, such as water binding and melting properties, as with gelatin. Examples of suitable gelatin replacers are described in, inter alia, European Patent Application EP 496466 and in EP 474299 and comprise carrageenan, pectins and  
10 propylene glycol alginate. When gelatin is substituted by carrageenan a concentration of 0.30 wt.% is appropriate.

The product according to the invention may comprise further ingredients such as herbs, salt, flavour or colouring agents.

5 The aqueous phase is acidified using edible acids as are e.g. citric acid, acetic acid and lactic acid, but preferably a microbiological acidification is used, employing a yoghurt culture, preferably a standard, thermophilic, mild yoghurt  
10 culture. The final pH preferably is about 4.65.

The spread is prepared according to the following standard procedure:

The water soluble ingredients (excluding gelatin and salt) are  
15 mixed at about 60°C. The mixture is pasteurised by keeping at 85°C for 15 - 20 minutes. The pasteurised mix is cooled to 46°C, and gelatin (in the form of a solution) and cooking salt are added, followed by homogenisation at 200 bar. To the emulsion having a temperature of 44°C a yoghurt culture is  
20 added and fermentation is allowed to proceed until a pH of about 4.8 is attained. Then citric acid (preferably in aqueous solution) is added. The pH is set at a final value of about  
4.65. The fermentation is stopped by heating to 64°C and the

product is stored in buffer tanks for up to 8 hours. Then the warm (about 55°C) oil phase (also containing the tocopherol ingredient) is dosed in-line to the aqueous phase. The mixture is immediately heated to 76°C and homogenised at 280 -  
5 300 bar. The homogenized product after filling into containers is cooled to below 10°C by conducting it through a cooling tunnel and is stored under chilled conditions. Optionally, flavour variants may be produced by adding after the final homogenisation step pre-pasteurised savoury preparations (e.g.  
0 a herb mixture, tomato or basil).

Said standard procedure is quite general and can be modified within the restrictions imposed by the broadest patent claim. For example, when desired, the fermentation step can be  
5 substituted by chemical acidification, as described hereinbefore.

The following example illustrates the invention.

#### EXAMPLE

##### Spread product

A spread product with a content of about 24 wt.% fat was prepared with the ingredients of Table III using the standard Procedure as described hereinbefore.

TABLE III

Ingredients	wt. %
Fat blend (1)	19.20
Butter milk powder	17.10

Ingredients	wt. %
Dairy cream (40%)	4.06
Cooking salt	0.80
Gelatin	0.45
Citric acid (30% solution )	0.20
Locust bean gum	0.12
Tocopherol mixture (2)	0.025
Corn germ oil	2.40
Defatted milk	3.95
Yoghurt culture	0.0528
Water	51.65
TOTAL	100

(1) Fat blend consists of a blend of linola oil (46%), sunflower oil (19%), rapeseed oil (22%) and an interesterified mixture (1:1) of palm oil stearin and palm kernel oil (13%).

(2) ex Sigma Aldrich (T2028) containing >80% d-tocopherol

The main characteristics of the composition of the obtained spread are summarized in Table IV.

TABLE IV

Product composition	wt. %
Fat phase	24
Total protein	6.5
Cooking salt	0.8
Tocopherol	0.025
Total dry matter (incl. fat)	41.5
Water	balance
pH	4.65

Fat phase composition	
Saturated fatty acids	21
of which C12 - C16 fatty acids	16
of which stearic acid	4
Mono-unsaturated fatty acids	26
Poly-unsaturated fatty acids	52
of which omega-3 fatty acids	6
Cholesterol	< 0.015
Trans fatty acids	<0.1

After 9 weeks of chilled storage the taste of the spread was assessed and appeared to comply with usual standards.

## CLAIMS

1. A spread consisting of an oil in water emulsion comprising 70 - 80 wt.% of an aqueous phase which contains 0.01 - 3 wt.% of a thickener, 0.05 - 15 wt.% of protein and 20 - 30 wt.% of a dispersed fat phase, the fat phase consisting of a triglycerides mixture containing 20 - 80 wt.% of mono-unsaturated fatty acid residues, at least 40 wt.% of polyunsaturated fatty acid residues, 4 - 10 wt.% of omega-3 fatty acid residues, 15 - 25 wt.% of saturated fatty acid residues, 12 - 20 wt.% of saturated fatty acid residues having a linear carbon chain with 12 - 16 carbon atoms, 1 - 8 wt.% of stearic acid residues, < 1 wt.% of trans fatty acid residues, fatty acid residues calculated on fat phase, which emulsion is characterized in that it contains 0.005 - 0.03 wt.% of delta-tocopherol.
2. A spread according to claim 1 characterized in that it contains 0.04 - 0.08 wt.% of citric acid.
3. A spread according to anyone of the previous claims characterized in that the tocopherol is added in the form of a tocopherol preparation in which delta-tocopherol and alpha-tocopherol are present in a weight ratio > 2.
4. A spread according to anyone of the previous claims characterized in that the tocopherol is added in the form of a tocopherol preparation in which the total amount of alpha-, beta- and gamma-tocopherol is less than 0.5 wt.%.

5. A spread according to anyone of the previous claims characterized in that it contains 0 - 1 ppm of EDTA.
6. A spread according to anyone of the previous claims characterized in that the aqueous phase contains locust bean gum and either gelatin or carrageenan.
7. A spread according to anyone of the previous claims characterized in that the fat phase contains 0 - 10 wt.% of dairy fat.
8. A spread according to anyone of the previous claims, characterized in that the protein is at least partially milk protein.

## ABSTRACT

Water continuous emulsion spread comprising 70 - 80 wt.% of an aqueous phase which contains  
0.01 - 3 wt.% of a thickener,  
0.05 - 15 wt.% of protein and  
20 - 30 wt.% of a dispersed fat phase, the fat phase consisting of a triglycerides mixture containing  
20 - 80 wt.% of mono-unsaturated fatty acid residues,  
at least 40 wt.% of polyunsaturated fatty acid residues,  
4 - 10 wt.% of omega-3 fatty acid residues,  
15 - 25 wt.% of saturated fatty acid residues,  
12 - 20 wt.% of saturated fatty acid residues having a linear carbon chain with 12 - 16 carbon atoms,  
1 - 8 wt.% of stearic acid residues,  
< 1 wt.% of trans fatty acid residues,  
fatty acid residues calculated on fat phase,  
which emulsion spread is characterized in that it contains  
0.005 - 0.03 wt.% of delta-tocopherol.